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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/550,227	09/20/2005	Peter Graham Richardson	05-769	7674
20306 7590 11/20/2007 MCDONNELL BOEHNEN HULBERT & BERGHOFF LLP 300 S. WACKER DRIVE 32ND FLOOR CHICAGO, IL 60606			EXAMINER LIU, HARRY K	
			ART UNIT 3662	PAPER NUMBER
			MAIL DATE 11/20/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

**Office Action Summary**

Application No.

10/550,227

Applicant(s)

RICHARDSON ET AL.

Examiner

Harry Liu

Art Unit

3662

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 29 October 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-30 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- ☐ Notice of Informal Patent Application
- ☐ Other: \_\_\_\_\_

### DETAILED ACTION

Receipt is acknowledged of applicant's amendment filed (10/29/2007). Claims (1-30) are pending and an action on the merits is as follows.

Applicant's arguments with respect to claims (1,15) have been considered but are moot in view of the new ground(s) of rejection.

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#### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maalouf (2002/0122002) in view of Andrews (6380908).

Regarding claims 1, 15, Maalouf discloses a time delay (see paragraph 0017 and FIG.1 below) beamformer (paragraph 0011) comprising a plurality of spaced apart input channels (antenna elements 160); a processor (article 170) receives input signals and generates processed signals (to reduce interference or reject unwanted signal components); steering time delay (paragraph 0017) and summation means to generate beamformed output (see article 140 in FIG. 1). Maalouf does not specifically disclose a processor to generate space-time signals or steering time delay. However, Andrews teaches spaced part array elements with sampled signals

(A/D converter) and processor (data re-alignment and digital receiver) (see FIG. 3 & 4 below). It would have been obvious to modify Maalouf with Andrews with the time delay and sampling method in order to function as beamformer.

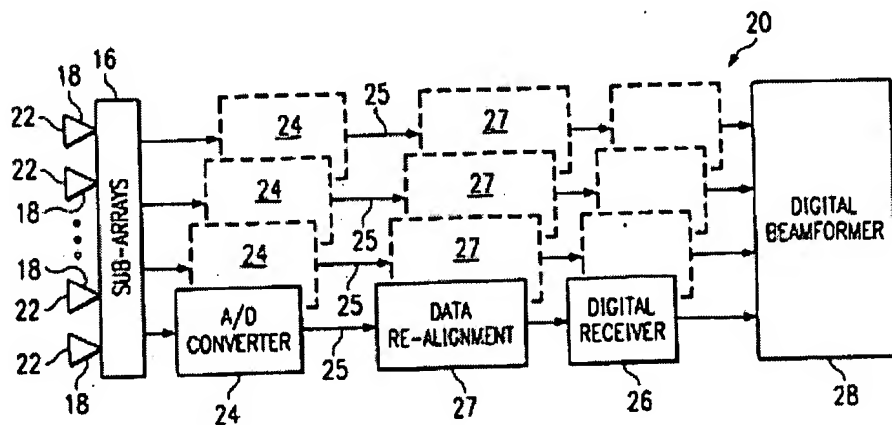


FIG. 3

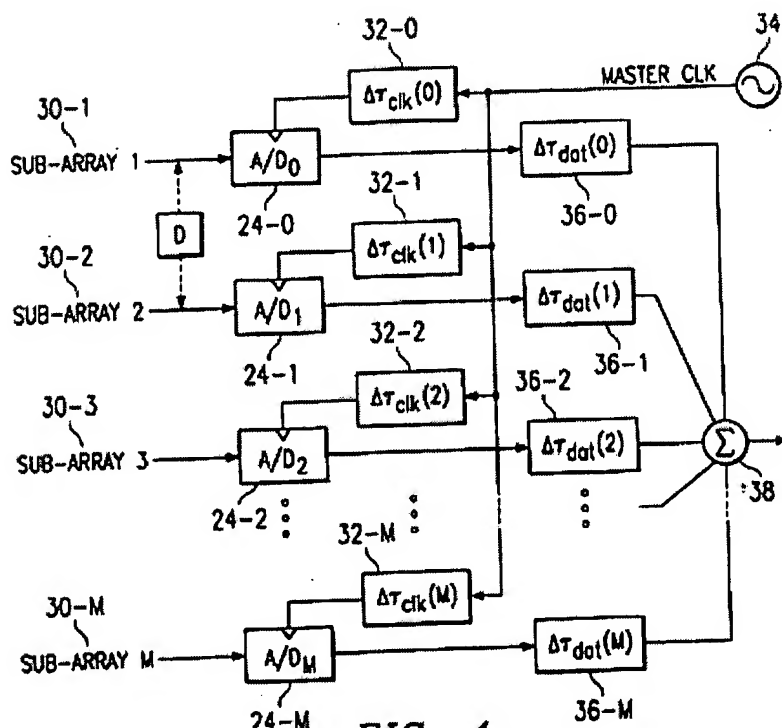


FIG. 4

Regarding claim 2, Maalouf discloses the processing means is arranged to output processed signals and the time delayed (article 110) signals are summed from a plurality of delayed signals.

Regarding claims 3,4, Maalouf discloses the processor produces as many processed signals and time delayed signals as the number of input signals (see 170 in FIG. 1 above). Note the figure shows corresponding numbers of inputs, processor outputs and time delayed signals.

Regarding claims 5, 16-18, Maalouf discloses the covariance matrix is generated from input channel and sampled signals (Abstract and paragraph 0007). The covariance matrix is  $N \times M$  matrix where  $N$  is the number of inputs and  $M$  is the tapped delay.

Regarding claims 6, 19 Maalouf discloses applying steering vectors ( $w_{sub.nm}$ ) to the matrix (paragraph 0017).

Regarding claims 7, 20, Maalouf discloses the processing means is to determine filter coefficients (steering vectors) in generating time delayed signals.

Regarding claims 8, 21, Maalouf discloses the time delay comprises time delay taps derived from input channels. The number of taps is based on based on sampling theorem which is about the pulse repetition interval.

Regarding claim 9, Maalouf discloses the time delay taps are derived from input channels (Abstract).

Regarding claim 10, Maalouf discloses the beamformer comprises  $N$  input channels and  $M$  time delay (paragraph 0038).

Regarding claim 11, Maalouf discloses the beamformer comprises nm time delay means and steered beam direction by building a matrix of nxm.

Regarding claim 12, Maalouf discloses the beamformer comprises a plurality of signal sensors (antenna elements) adapted to detect incident wave (GPS signals received) at different places (spatial characteristics of N elements). The tapped signals are fixed in time interval.

Regarding claim 13, 22, Maalouf discloses the beamformer steering time delay applied by the steering time delay means to a particular channel are variable (adaptive) depending on the signals received by other channel.

Regarding claims 14, 23, Maalouf discloses the beamformer processing is programmed (processor is program based) to apply adaptive weight to the signals of the input channels. An adaptive weight is applied based on (variable) other input channel signal received.

Regarding claim 24, Maalouf discloses the summing of the delayed signals to form a beamform output (see FIG. 1).

Regarding claim 25, Maalouf discloses all the claim limitations in the rejection of claim 1 above except for specifying method for increasing the resolution of a sideways sensing sensor array. This feature is inherent since reducing interference in the received signals is increasing of resolution. By reducing interference, the signal received exhibit as a cleaner signals, this is an increase in resolution.

Regarding claim 26, Maalouf discloses the adaptive processing beamformer is a STAP (paragraph 0011) processor which is capable of producing beam direction simultaneously.

Regarding claim 27, Maalouf discloses use of N elements for input which is multiple directions (5 or more).

Regarding claim 28, Maalouf discloses all claim limitations in the rejection of claim 1 except for specifying beamformer used in radar application. However it is known that beamformer is famous for its application in radar field. It would have been obvious to use this beamformer in radar.

Regarding claim 29, Maalouf discloses the adaptive processing beamformer is a STAP (paragraph 0011) processor which is capable of producing beam direction simultaneously.

Regarding claim 30, Maalouf discloses the beamformer is for rejecting unwanted signal components (reducing interference).

It is noted that applicant does not separately argue for the feature of other claims.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within

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TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Harry Liu whose telephone number is 571-270-1338. The examiner can normally be reached on Monday -Thursday and every other Friday...

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas Tarcza can be reached on 571-272-6979. The fax phone number for the organization where this application or proceeding is assigned is 571-270-2338.



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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Harry Liu  
Examiner  
Art Unit 3662  
November 15, 2007



THOMAS H. TARCZA  
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